WHAT IS CLAIMED IS:

1. A method for forming a film on a surface of a substrate, the film having an intermediate layer at an interface with the substrate, the method comprising:

a preliminary oxidation step of forming an oxide layer of the substrate by oxidation thereof; and

a coating step of coating the surface with a coating material containing at least one of an alloy and a compound, each of which contains an element forming an oxide having a low enthalpy of formation as compared to that of the oxide of the substrate.

2. The method for forming a film, according to Claim 1, wherein the coating step further comprises a heating step.

3. The method for forming a film, according to Claim 1 or 2, wherein the coating step further comprises a pressure applying step.

4. The method for forming a film, according to Claim 1, wherein, in the coating step, the film is formed by one of hot press sintering, plasma spraying, hot isostatic pressing sintering, and spark plasma sintering.

5. The method for forming a film, according to one of Claims 1, 2 and 4 wherein the coating material comprises a compound containing aluminum as the compound forming an oxide having a low enthalpy of formation as compared to that of the oxide of the substrate.

6. The method for forming a film, according to one of Claims 1, 2 and 4, wherein the coating material comprises at least one selected from the group consisting of an Ni-Al based alloy, a Pt-Al based alloy, an Fe-Al based alloy, an Mo-Si-Al based alloy, a Co-Al based alloy, a Cr-Al based alloy, an Ir-Al based alloy, and a compound thereof, each of which forms an alumina layer on a surface of a coating layer at a high temperature of 1,000°C or more.

7. The method for forming a film, according to Claim 6, wherein the coating

material comprises a molybdenum based compound represented by $Mo(Si_{1-x}Al_x)_2$, wherein x is from 0.05 to 0.6

8. The coating material according to Claim 1, wherein the coating material is a composite material which comprises 70% or more of $Mo(Si_{1-x}Al_x)_2$ on a volume percent basis and at least one selected from the group consisting of TaB_2, HfB_2, MoB, and AlN, wherein x is from 0.05 to 0.6.

9. The coating material according to Claim 1, wherein the coating material is a composite material which comprises 50% or more of $Mo(Si_{1-x}Al_x)_2$ on a volume percent basis and at least one selected from the group consisting of SiC and mullite, wherein x is from 0.05 to 0.6.

10. The method for forming a film, according to one of Claim 3 wherein the coating material comprises a compound containing aluminum as the compound forming an oxide having a low enthalpy of formation as compared to that of the oxide of the substrate.

11. The method for forming a film, according to one of Claim 3, wherein the coating material comprises at least one selected from the group consisting of an Ni-Al based alloy, a Pt-Al based alloy, an Fe-Al based alloy, an Mo-Si-Al based alloy, a Co-Al based alloy, a Cr-Al based alloy, an Ir-Al based alloy, and a compound thereof, each of which forms an alumina layer on a surface of a coating layer at a high temperature of 1,000°C or more.

12. The method for forming a film, according to one of Claim 5, wherein the coating material comprises at least one selected from the group consisting of an Ni-Al based alloy, a Pt-Al based alloy, an Fe-Al based alloy, an Mo-Si-Al based alloy, a Co-Al based alloy, a Cr-Al based alloy, an Ir-Al based alloy, and a compound thereof, each of which forms an alumina layer on a surface of a coating layer at a high temperature of 1,000°C or more.

13. The method for forming a film, according to Claim 11, wherein the coating material comprises a molybdenum based compound represented by $Mo(Si_{1-x}Al_x)_2$, wherein x is from 0.05 to 0.6.

14. The method for forming a film, according to Claim 12, wherein the coating material comprises a molybdenum based compound represented by $Mo(Si_{1-x}Al_x)_2$, wherein x is from 0.05 to 0.6.